MICRO WELD

MODEL AD 3-5
HEAVY DUTY
NON-FERROUS

BUTT WELDERS

MICRO PRODUCTS COMPANY

SERVICE MANUAL

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1.0 SPECIFICATIONS	**MODEL AD-3**	**MODEL AD-4**
Welding Range Copper Wire	.187 to .375 in. DIA.	.250 to .500 in. DIA.
Welding Range Aluminum Wire	.250 to .500 in. DIA.	.375 to .750 in. DIA.
Welding Range Copper Conductors	.232 to .437 in. DIA. 4ga to 2/0	.292 to .547 in. DIA. 2ga to 250MCM
Welding Range Aluminum Conductors	.292 to .547 in. DIA. 2ga to 250MCM	.437 to .853 in. DIA. 2/0 to 550MCM
Maximum Line Demand 460 Volt	62amps@100% duty cycle 196amps@10% duty cycle	115 amps@100% duty cycle 362 amps@10% duty cycle
Maximum Line Demand 230 Volt	124amps@100% duty cycle 390amps@10% duty cycle	230 amps@100% duty cycle 724 amps@10% duty cycle
Single Phase AC Transformer	40 KVA @ 50% duty cycle	75 KVA @ 50% duty cycle
Clamp Method Upset Method	Pneumatic, Foot Controlled Pneumatic, Adjustable	Pneumatic, Foot Controlled Pneumatic, Adjustable
Mounting	4-Caster Wheels/STD.	4-Caster Wheels/STD.

Dimensions and Weights

Height Overall	50 in.	50 in.
Floor Space	57 in. x 29 in.	62 in. x 36 in.
Welding Die Height	43 in.	43 in.
Weight	1350 LBS	1500 LBS

SPECIFICATIONS	**MODEL AD-5**
Welding Range Copper Wire	.375 to .750 in. DIA.
Welding Range Aluminum Wire	.500 to .875 in. DIA.
Welding Range Copper Conductors	.437 to .853 in. DIA. 2/0 to 550MCM
Welding Range Aluminum Conductors	.547 to .998 in. DIA. 250MCM to 750MCM
Maximum Line Demand 460 Volt	228amps@100% duty cycle 727amps@10% duty cycle
Maximum Line Demand 575 Volt	184amps@100% duty cycle 582amps@10% duty cycle
Single Phase AC Transformer	150 KVA @ 50% duty cycle
Clamp Method Upset Method	Pneumatic, Foot Controlled Pneumatic, Adjustable
Mounting	4-Caster Wheels/STD.

Dimensions and Weights

Height Overall	50 in.
Floor Space	62 in. x 36 in.
Welding Die Height	43 in.
Weight	1700 LBS

FEATURES

- Micro Weld quality and workmanship
- Heavy-duty construction & components

- Easy to operate controls
- Low maintenance costs
- Easy to set welding parameters
- Safety electrical switch circuits
- Heavy-duty weld heat selection switch
- Sensitive straight slide movable headpiece assembly

2.0 GENERAL OPERATING INSTRUCTIONS

2.1 ELECTRICAL HOOK-UP INSTRUCTIONS

First determine that available electrical service in your plant corresponds to the nameplate rating located on welder housing. Electrical wiring to welder must be of sufficient size to deliver full ampere load with no appreciable loss during weld cycle. The welder will not operate properly if there is more than a 10% variation in the line voltage. In general, the welder should be fused with a slow blow fuse of the 100% duty cycle rating. The minimum power cable size to the welder can be obtained by using this same current rating.

Refer to National Electrical Code and local electrical regulations for adequate power sizes; disconnect methods and fusing guidelines.

Remember, line voltages to the welding machine are potentially dangerous should the power cords be damaged or severed. The welding voltages at the welding dies will not harm an operator since they do not exceed 10 volts.

2.2 SAFETY PRECAUTIONS
(See section 11.0)

2.2.1 ELECTRICAL

Maintain electrical cable to welder in good repair. Welder must be grounded and connections securely tightened. Heat Switch must not be changed to new position while a weld cycle is in process. Disconnect electrical service before serving welder – high voltages are located within the base of the welder.

2.2.2 MECHANICAL

Operator while using welder must wear safety glasses. Keep all safety guards on welders and use properly. Operators must be instructed on basic operation of unit to prevent injury. Check nameplate rating and keep within material size range for each welder.

2.3 WATER HOOK-UP
(If so equipped)

It is important that if a welder is to be operated for an extended period of time and head heat up, water lines must be connected to the welder. Connect hoses to inlet and outlet provided at the back of the welder. Shut-off valve should be installed in the inlet line and the hose from the outlet should run to an open sight drain. Water should be turned off when welder is not in use.

2.4 AIR HOOK-UP

Set air regulators for from 20 to 90 lbs. A safety pop-off valve will be activated when air gauge is set for over 100 lbs.

2.5 WELDING DIES

The dies and shoes supplied with the welder will handle most size and material types within the range of the welder. For new weld applications consult the factory for special die and shoe sets.

3.0 BASIC OPERATING PARTS

3.1 MODEL AD-3, 4 or 5

3.1.1 WELD HEAT SELECTION SWITCH

Welding heat is selected by means of a heavy-duty tap switch with either eight or twelve steps of voltage. Number one indicates the highest heat setting and number eight or

twelve indicates the lowest heat setting. The switch is conveniently located on the lower front of the welder.

Note: The following items can be located on Print #B5800 in Section 9.1.

3.1.2 HEADPIECE CLOSED SPACE ADJUSTING BOLT

The closed space-adjusting bolt is located on the movable headpiece end plate. Refer to Item 1A.

3.1.3 HEADPIECE OPEN SPACE ADJUSTING BOLT

The open space-adjusting bolt is located on the upset mechanism on the lever bar. Refer to Item E.

3.1.4 LIMIT SWITCH ADJUSTING BOLT

The limit switch-adjusting bolt is located on the lever bar on the upset mechanism. Refer to Item F.

3.1.5 TOGGLE LINK

The toggle link is located on the upset mechanism. Refer to Item G.

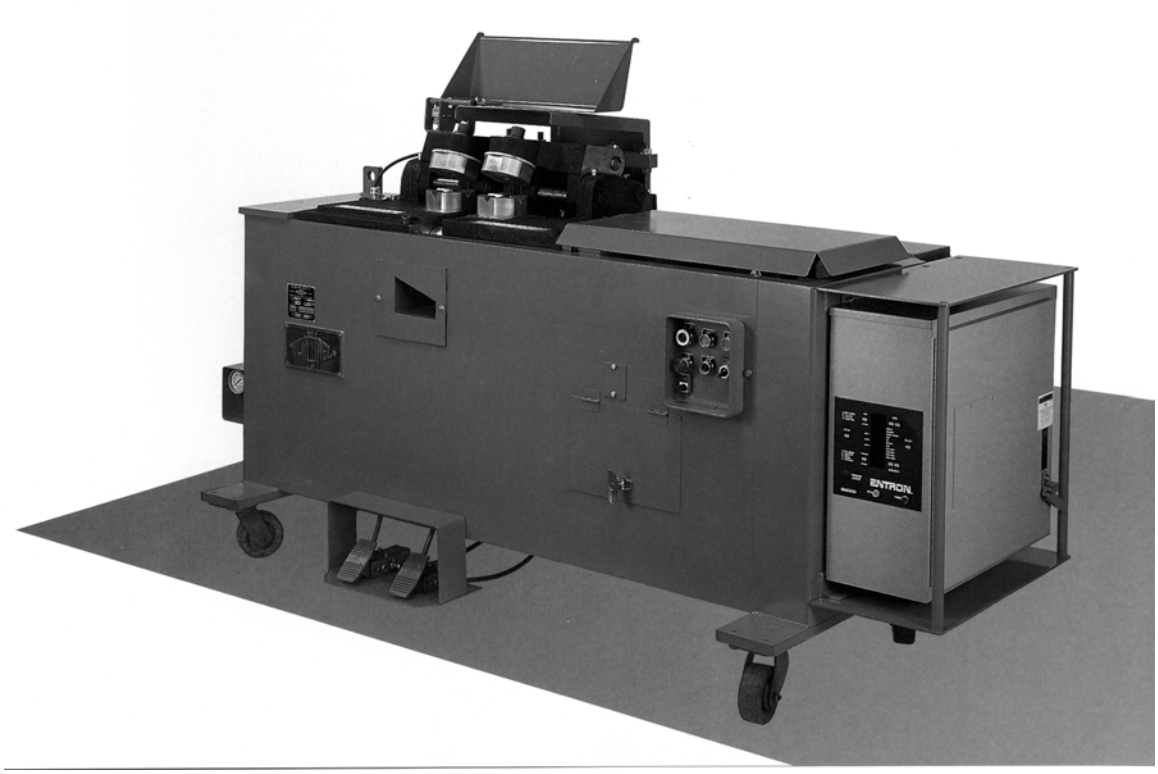
3.1.6 UPSET LEVER LIMITING BRIDGE

The upset lever limiting bridge is located on the upset mechanism. Refer to Item H.

3.1.7 UPSET LEVER ARM

The upset lever arm is located in the middle of the upset mechanism. Refer to Item I.

4.0 BASIC OPERATING PARTS LOCATION



5.0 TYPICAL OPERATING SEQUENCE

All insulating materials must be removed from conductors where they contact lower welding dies.

5.1 Set weld heat selection switch to recommended chart setting.

5.2 Set upset pressure to recommended chart setting (PSI).
5.3 Adjust the head open space to proper chart setting.
5.4 Place the stock into welding dies so wire ends meet midway between each die. Clamp into position with foot valve pedals.

5.5 Lower the flash guard and lift the operating lever until it initiates the operation switch, hold for 1 to 3 seconds to assure a complete weld cycle.
5.6 Unclamp welded conductors.
5.7 Trim off weld burr so welded area is equal to parent material diameter. Incomplete burr removal or undercutting of the weld area will result in subsequent weld breaks.

6.0 SPECIAL ADJUSTMENTS (FIG. 2)

6.1 Item "A" is used for head closed space adjustment. This may have to be adjusted as die and shoe inserts wear, for this reason it's best to keep like size grooves in one die set. As the ends wear they can be used until an even amount takes place then adjust closed headspace again.

When replacing worn dies with new or rebuilt ones, turn bolt "A" in about ½" or 12.7mm to prevent ends from being damaged when adjusting new closed space.

To adjust new head closed space after new weld dies and clamp shoes have been installed. Lift up on hand operated air valve lever and hold in place with small wire through ears on valve body and hole in lever. Adjust bolt "A" until there is .005 to .010" to .127 to .254mm between inserts in ends of weld dies. Lock bolt "A" in place with locknut.

6.2 Item "E" head open space adjustments. This also adjusts the amount of low-pressure travel on the weld cycle.

6.3 Item "F" limit switch adjustment screw. This screw should be adjusted to where plunger on limit switch is pushed down into threaded tube ¼". This adjustment is made with nothing in welding dies and initiating the operating lever.

6.4 Item "G" toggle link. This changes the vertical motion of the upset lever to a horizontal movement.

6.5 Item "I" upset lever. This lever pivots at the rear with air cylinder pushing front end of lever up. Angle ground on front end of upset lever pushes against lazy arm roller moving welder headpieces together.

6.6 Item "H" upset lever-restricting bridge, which limits movement of upset lever.

6.7 AD-3, AD-4, & AD-5
ADJUSTMENTS AND DIE INSTALLATION

6.7.1 To prevent damage to dies or personal injury, disconnect power and reduce air pressure gauges to "O".

6.7.2 Loosen locknut on "closed" headpiece space adjusting screw and turn screw in approximately 3/8" to allow clearance between worn welding dies. Figure 1 and Designation "X".

6.7.3 Loosen locknut on "open" headpiece space adjusting screw and turn bolt counter clockwise to lower leverage bar. Figure 1 and Designation "Y".

6.7.4 Remove welding dies and clamp shoes.

6.7.5 Brighten with #2/0 emery cloth wipe clean:

A. Attaching surfaces of replacement welding dies – place on flat surface to brighten.
B. Attaching surfaces of replacement welding die shoes – place on flat surface to brighten.
C. Welding die seats on stationary and movable headpieces – file with care to eliminate pitted or burnt surfaces. Polish with emery cloth. (Note: Damaged die seats indicate poor installation procedures or loose welding dies).
D. Clamp arm die shoe seats – polish with emery cloth.
E. Wipe all contact surfaces with quick evaporating, low residue cleaner.

6.7.6 Install new welding dies (lower set), welding die shoes (upper set) and align.

A. Place clean welding dies in die seats and lightly tighten into position. (Note: Die sets are marked with a machining code).
B. Attach clean welding die shoes to clamp arms and lightly tighten into position.
C. Select a straight piece of rod that corresponds to one of the exact die grooves and place across and spanning welding dies to assist in alignment.

D. Adjust upset air regulator to approximately 10 PSI and clamp aligning rod into place.
E. Tap welding dies and die shoes into best alignment and tighten upper die shoes.
F. Release clamp arms and carefully tighten welding dies.

6.7.7 Adjust upset air regulator to approximately 10 PSI and activate operating lever, place the locking pin in topside of air operating lever to hold movable headpiece in this position. Adjust head "closed" adjusting screw to specifications shown in Figures 1 and 1A. Tighten locknut.

6.7.8 With adjustment #7 completed, leave headpiece in adjusted closed position and make following limit switch adjustments.
A. Mark stem of depressed limit switch with pencil as shown in Figure 1C.
B. Release operating lever to allow movable headpiece to return to a rest position.
C. Check pencil mark to specifications shown in Figures 1 and 1C. Adjust limit switch adjusting screw to obtain proper switch setting. Recheck if necessary. (Note: Important adjustment as it determines fusion point of a successful weld. Adjustment remains same for all sizes).

6.7.9 Headpiece open space may be checked by allowing movable head to return to rest position. Adjust head "open" adjusting screw to specifications in 1B.

6.7.10 Restore correct air pressures and power to welder.

6.7.11 Should the need arise to reset only the upset mechanism adjustments steps 4, 5 and 6 may be eliminated.

WELDER ADJUSTMENTS AND LUBRICATION (FIG. 1)

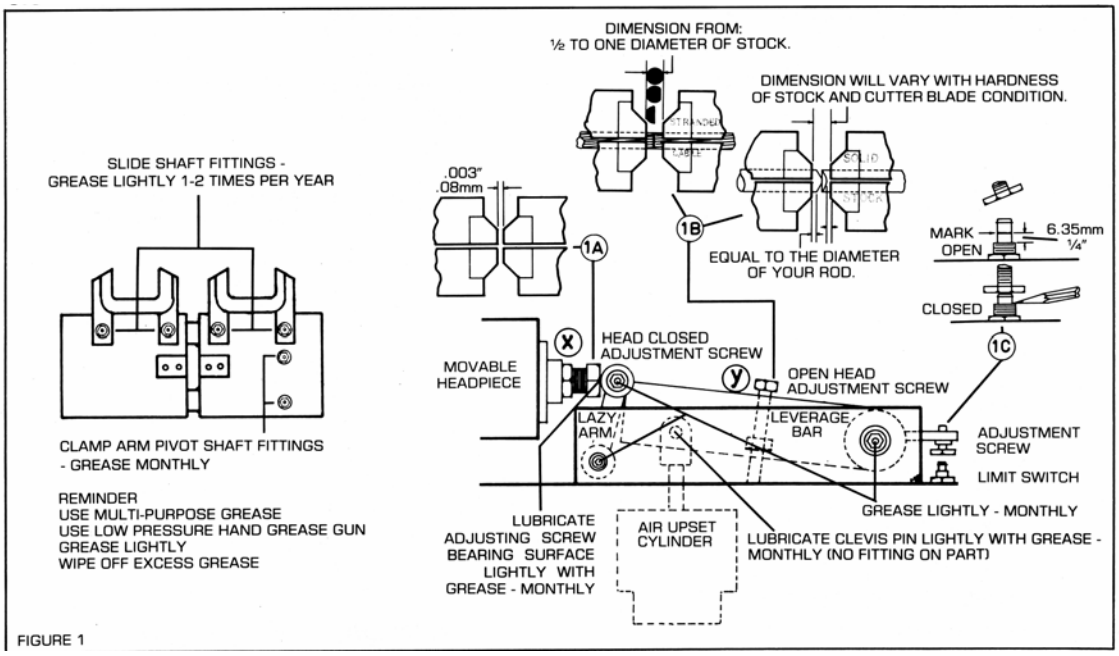
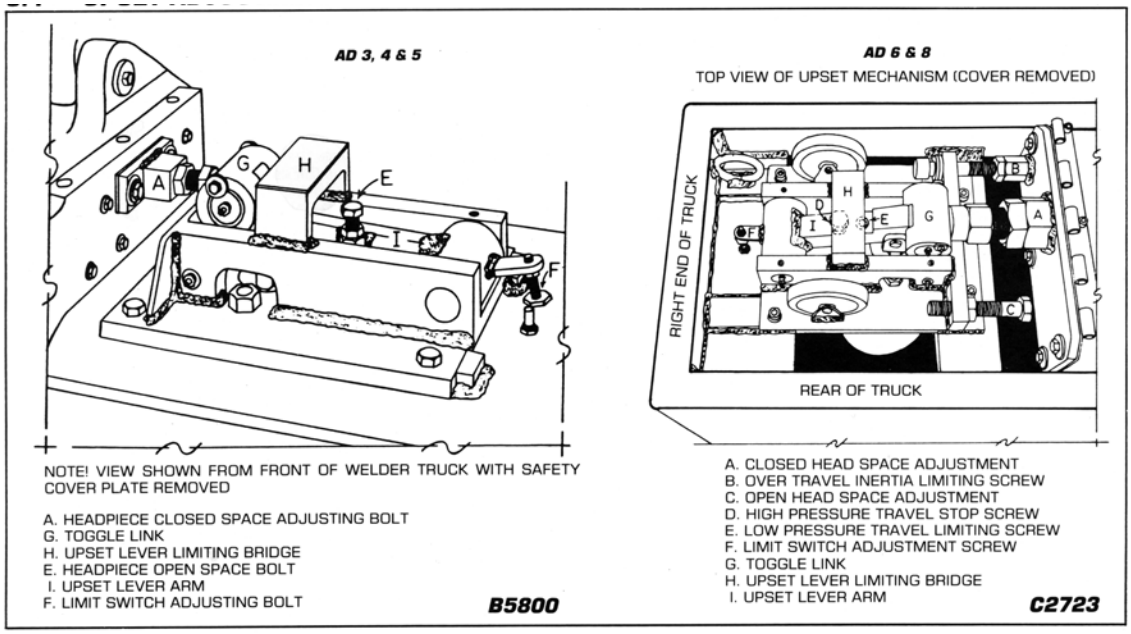


FIGURE 1

UPSET ADJUSTMENTS (FIG. 2)



7.0 PREVENTIVE MAINTENANCE TECHNIQUE

Keep in Mind that these welders are precision built to last many years, but will require proper maintenance procedures. They are designed to be as automatic as possible with a

minimum dependence on the ability of the operator. Those must make adjustments thoroughly familiar with the operating principles of the welders.

7.1 WELDING DIE NOTES

7.1.1 **Welding dies and die shoes in poor condition are the primary cause of poor quality welds**.

7.1.2 Check die sets for excessive wear and replace if necessary.

7.1.3 Clean weld die bottoms to remove oxides with emery cloth placed on a flat surface.

7.1.4 Clean die seats with emery cloth to brighten contact areas.

7.1.5 After cleaning of dies be sure to wipe off with soft clean cloth.

7.1.6 Completely tighten dies into seats to assure a good contact.

7.1.7 Worn dies will not hold stock during a weld cycle, replace worn dies.

7.2 WEEKLY

7.2.1 Tighten all loose parts.

7.2.2 Check for water leaks (if applicable).

7.2.3 Check for air leaks.

7.2.4 Drain airline filter bowls.

7.2.5 Tighten all loose parts.

7.3 QUARTERLY

7.3.1 Repeat above service items.

7.3.2 Check grease requirements on clamp arms pivot shafts and lubrication points.

7.3.3 Check anneal parts and replace all worn or broken assemblies

7.3.4 Check contacts on magnetic contactor for worn contacts.

7.3.5 Clean heat switch contacts with low residue cleaner and recoat with petroleum jelly.

7.4 ANNUALLY

7.4.1 Repeat previously noted items.

7.4.2 Check for wear in clap arm pivots.

7.4.3 Clean inside and outside of welder.

7.4.4 Check grease requirements on headpiece slide shafts, grease lightly.

7.4.5 Caution: make sure that power supply is disconnected before servicing welder in anyway!

7.5 WELDING DIES AND DIE SHOES INFORMATION

Description:

Welding dies – Lower conducting electrode and clamp jaw.

Welding die shoes – Upper clamping member.

Welding dies and die shoes in poor condition are the main causes of bad welds.

Care of die sets:

7.5.1 Use a brass or fiber blade to remove particles of flashings that build-up on die sets. Excessive flash build-up causes die burns on material and shorting of die sets.

7.5.2 Do not attempt to clamp material that is not suited for welder into die sets. Undersize materials will slip and burn die grooves, oversize materials will overstress clamping parts.

7.5.3 Do not use welding die sets for a vise. These parts will not withstand the mechanical abuse.

7.5.4 Whenever welding dies are replaced, clean bottoms of dies and corresponding die seats to a bright and clean condition before bolting them tightly into place. An oxidized surface will insulate the welding dies and reduce effective welding voltage.

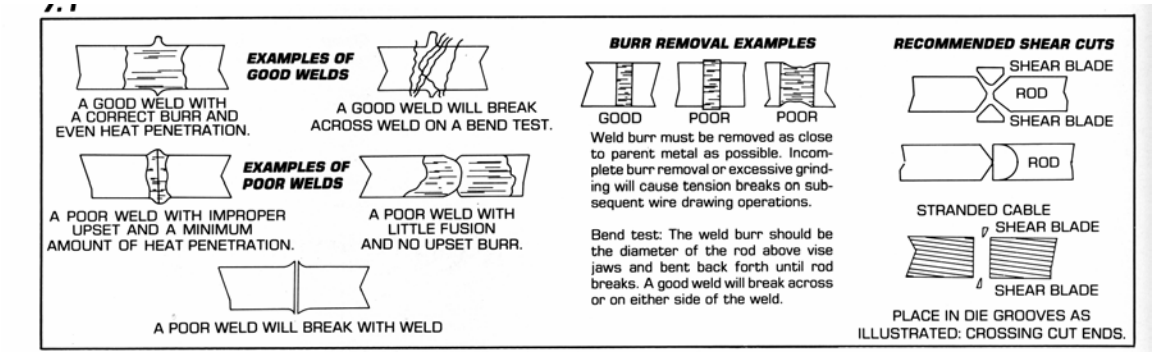
7.5.5 Welding die set will wear with use and must be changed occasionally for good welding results. Keep and adequate supply of replacement parts available. Wire and rod slippage is a problem caused by poor die sets and a major cause of wire breaks.

8.0 SUGGESTED SETTINGS

Material	Size	Weld Heat Setting	Die Closed Space	Die Open Space	Upset Pressure	Clamp Pressure	Limit Switch Setting	Upset Arm Movement
Model AD-3								
Aluminum Rod	.375	7	.005	.375	25 PSI	90 PSI	¼	
Aluminum Rod	.250	11	.005	.250	20 PSI	90 PSI	¼	
Copper Rod	.250	5	.005	.250	30 PSI	90 PSI	¼	
Copper Rod	.375	2	.005	.375	30 PSI	90 PSI	¼	
Copper	4 GA.	6	.005	.500	30 PSI	90 PSI	¼	
Aluminum	250MCM	1	.005	.625	40 PSI	90 PSI	¼	

Model AD-4								
Aluminum Rod	.375	4	.005	.375	30 PSI	90 PSI	¼	
Aluminum Rod	.750	2	.005	.750	40 PSI	90 PSI	¼	
Copper Rod	.375	4	.005	.375	35 PSI	90 PSI	¼	
Copper Rod	.500	1	.005	.500	45 PSI	90 PSI	¼	
Copper	350MCM	2	.005	.500	40 PSI	90 PSI	¼	
Aluminum	#2	11	.005	.625	35 PSI	90 PSI	¼	
Aluminum	350MCM	5	.005	.625	55 PSI	90 PSI	¼	
Model AD-5								
Aluminum Rod	.375	6	.005	.375	30 PSI	90 PSI	¼	
Aluminum Rod	.750	1	.005	.750	35 PSI	90 PSI	¼	
Copper Rod	.375	4	.005	.375	25 PSI	90 PSI	¼	
Copper Rod	.750	1	.005	.750	45 PSI	90 PSI	¼	
Aluminum	#2	8	.005	.500	30 PSI	90 PSI	¼	
Aluminum	500MCM	4	.005	.625	35 PSI	90 PSI	¼	
Copper	500MCM	1	.005	.625	35 PSI	90 PSI	¼	
Copper	#2	5	.005	.500	30 PSI	90 PSI	¼	

8.1 WELD EXAMPLES


EXAMPLES OF GOOD WELDS
A GOOD WELD WITH A CORRECT BURR AND EVEN HEAT PENETRATION.
A GOOD WELD WILL BREAK ACROSS WELD ON A BEND TEST.
EXAMPLES OF POOR WELDS
A POOR WELD WITH IMPROPER UPSET AND A MINIMUM AMOUNT OF HEAT PENETRATION.
A POOR WELD WITH LITTLE FUSION AND NO UPSET BURR.
A POOR WELD WILL BREAK WITH WELD
BURR REMOVAL EXAMPLES
GOOD
POOR
POOR
Weld burr must be removed as close to parent metal as possible. Incomplete burr removal or excessive grinding will cause tension breaks on subsequent wire drawing operations.
Bend test: The weld burr should be the diameter of the rod above vise jaws and bent back forth until rod breaks. A good weld will break across or on either side of the weld.
RECOMMENDED SHEAR CUTS
SHEAR BLADE
ROD
SHEAR BLADE
ROD
STRANDED CABLE
SHEAR BLADE
SHEAR BLADE
PLACE IN DIE GROOVES AS ILLUSTRATED: CROSSING CUT ENDS.

9.0 DIAGNOSTIC CHART FOR TROUBLE SHOOTING

Welding Action	**Cause**	**Remedy**
Welding action normal burr does not extend beyond rod	Shear cut	Increase stating space
Molten metal blown out and material does not join	High heat	Lower heat setting
	Limit switch adjust	Set to depress ¼"
	Small stock	Check nameplate rating
	Low upset pressure	Increase upset pressure
	Air system	Clean air filters
Weld area does not heat enough to complete weld	Low heat	Increase heat settings
	Transformer secondary connection	Clean and tighten
	Welding dies	Clean and tighten
	Staring space	Decrease starting space
Dry looking weld	Upset pressure	Decrease settings

	Limit switch	Set to depress ¼"
Misalignment of rod	Worn die grooves	Replace die sets
	Starting space	Decrease staring space
	Welder head loose	Return for reconditioning
Rod ends buckle and not welded	Weld heat	Increase heat
	Starting space	Decrease starting space
	Upset pressure	Decrease pressure
	Welding dies	Clean or replacement
Welder inoperative	Fuses	Check power supply
	Time delay switch	Check continuity of circuits
	Operating or limit switch	Check continuity of circuits
	Heat switch	Tighten loose connections
	Contactor	Check continuity of circuits
	Welding transformer	Check continuity of circuits
	Auto-transformer	Check continuity of circuits
Variations in welds	Stock slippage	Undersize stock
		Replace worn dies
		Set clamp pressure to 90 psi
		Leaking clamp cylinder
	Input voltage	Check power input
		Only 5% drop permissible
		Inadequate wiring
	Loose transformer secondary	Clean and tighten
	Loose welding dies	Clean and tight or replace
	Binding movable headpiece rod connection	Remove all rod ends
		Clean contact area
	Preparing rod end	Replace rod cutter jaws
		Require consistent cuts
	Weld contactor	Replace contacts and check operation
	Time delay switch in weld circuit	Increase air stabilization time-install timer on early units

9.1 ELECTRICAL TROUBLE-SHOOTING OF WELDER

(**Caution**! Extreme care should be exercised when making these tests. Dangerous voltages are present in the welder. Only persons familiar with electrical safety precautions should perform these tests.)

9.1.1 TROUBLE-SHOOTING TABLE
(See section 9.1.3)

This electrical trouble-shooting table is furnished as a suggested method of trouble-shooting the welder. The individual steps of the table should be performed in the order given, to make the tests valid. The electrical

schematic (section 10) furnished for these tests show the table test points. The table may be used for welders with a different but closely related wiring by using corresponding test points. During all tests, line voltage should be connected to L1 & L2 of the welder. The heat switch should be set to the #1 position.

9.1.2 FINAL ELECTRICAL CHECKS

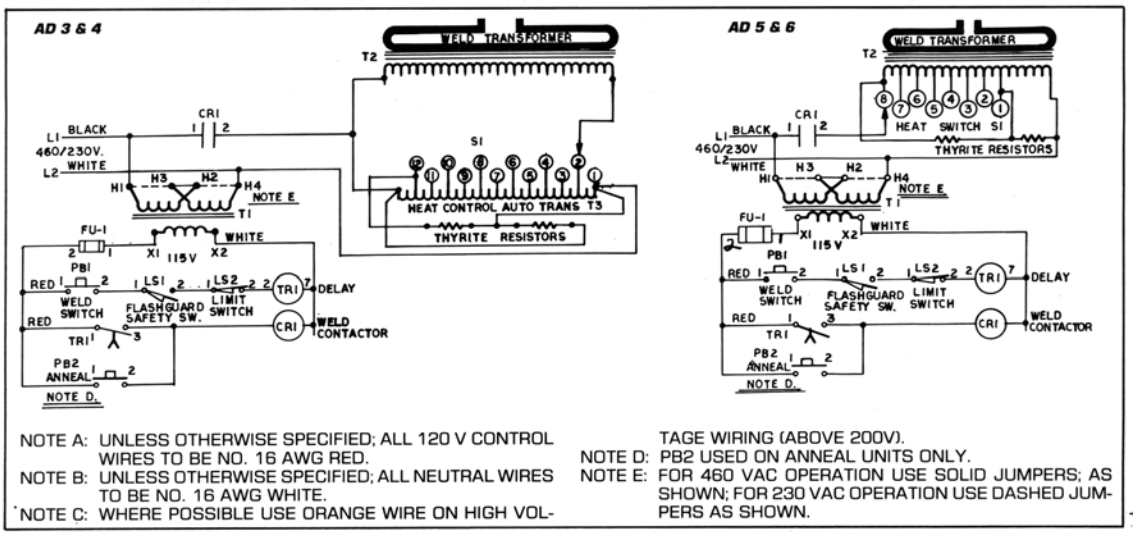
Set the heat switch to the number 1 position; connect the voltmeter across the welding dies. Press the operating switch. The meter reading will typically be less than 10 VAC. Consult the weld specification sheet for this value. Rotate the heat switch through all settings. If the voltage is not read at any setting, the heat switch may be defective. Actuate the weld limit switch; observe the reading goes to zero. Release the weld limit and operating switches, the reading should remain at zero.

9.1.3

TEST LEAD CONNECTION	METER READING	PROBLEM IF NO READING	PRESS OPERATING SWITCH	WELD LIMIT SWITCH ACTUATED	PRESS ANNEAL SWITCH
X1 X2	115 VAC	Bad control transformer			
X2 FU1-1	115 VAC	Bad fuse connection			
X2 FU1-2	115 VAC	Open fuse			
X2 PB1-1	115 VAC	Open wire to operating switch			
X2 PB1-2	115 VAC	Bad operating switch	X		
X2 LS1-2	115 VAC	Open flashguard switch	X		
X2 LS2-1	115 VAC	Open wire to weld limit switch	X		
X2 LS2-2	115 VAC	Open weld limit switch	X		
X2 PB2-1	115 VAC	Open wire to anneal switch			
X2 PB2-2	115 VAC	Bad anneal switch			X
X2 TR1-3	115 VAC	Bad time delay relay	X		
L2 CR1-1	Line voltage	Open wiring to contactor			
L2 CR1-2	Line voltage	Bad contactor	X		

NOTE: To perform repair consult section 13 for parts identification.

10.0 ELECTRICAL SCHEMATIC



NOTE A: UNLESS OTHERWISE SPECIFIED; ALL 120 V CONTROL WIRES TO BE NO. 16 AWG RED.

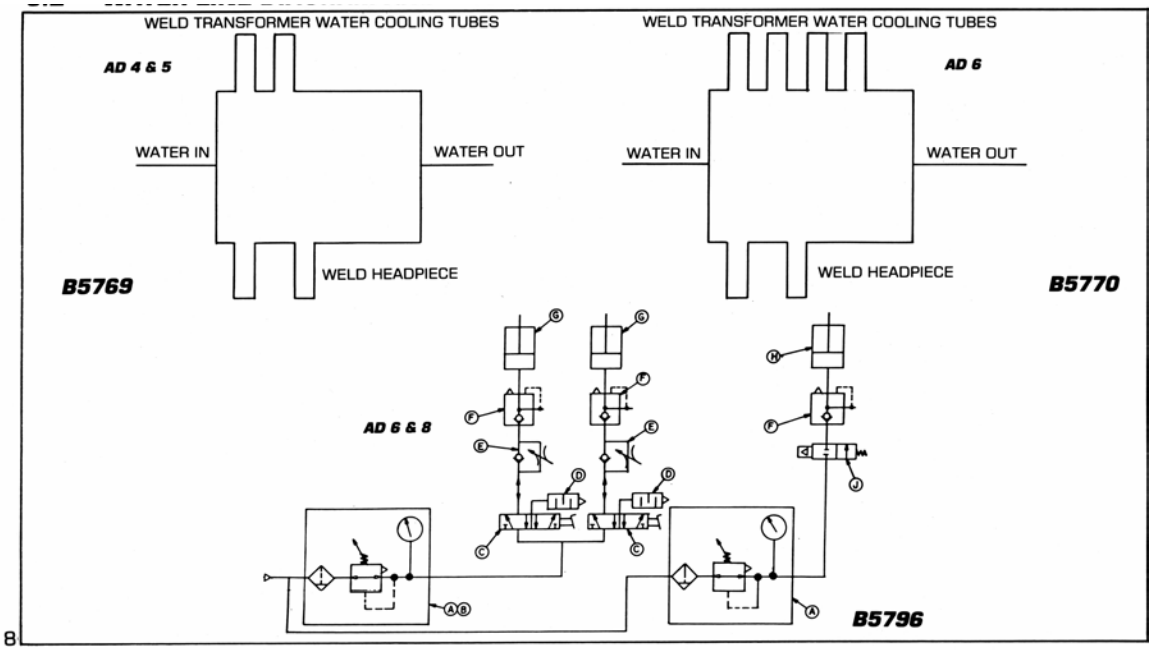
NOTE B: UNLESS OTHERWISE SPECIFIED; ALL NEUTRAL WIRES TO BE NO. 16 AWG WHITE.

NOTE C: WHERE POSSIBLE USE ORANGE WIRE ON HIGH VOLTAGE WIRING (ABOVE 200V).

NOTE D: PB2 USED ON ANNEAL UNITS ONLY.

NOTE E: FOR 460 VAC OPERATION USE SOLID JUMPERS; AS SHOWN; FOR 230 VAC OPERATION USE DASHED JUMPERS AS SHOWN.

10.1 PNEUMATIC SCHEMATIC



11.0 SAFETY REMINDERS

The following accident prevention information is presented to eliminate potential hazards while operating, inspecting

or repairing Micro-Weld electric resistance welding equipment.

Important safety compliance information for Micro-Weld Welders.

GENERAL

1. Qualified personnel, prior to using equipment, must instruct an operator on basic operation and malfunction methods.
2. Safety eyeglasses must be worn by all personnel operating or servicing welders.
3. Use safety equipment properly and keep safety equipment on welders.
4. Determine that both operating voltages and hertz (cycles) of power supply correspond to ratings listed on welder nameplate located on welder housing.
5. Check nameplate ratings and keep within capacities and material categories stated therein.
6. Adjustments or repairs must be made by persons thoroughly familiar with operating principles of welder.
7. Welder must be disconnected from power supply prior to maintenance or repair procedures.

ELECTRICAL

1. Refer to National Electrical Code and local regulations for adequate electrical wiring to power welder. Do not operate welder with inadequate electrical power supply cords or cable.
2. All welders must be grounded through power supply and welder ground connection terminal securely tightened.
3. All welders must be able to be disconnected from power source either by a double breaking disconnect switch or unplugged by standard rated plugs.
4. All welders must be fused to prevent injury should an electrical malfunction occur. Welders must never be fused for an ampere load that exceeds the ratings stated on welder nameplate. Normally welders are fused using the nameplate rated load; time lag parameters functional to standard fuses allow this specification.
5. Electric power cords to welder must be kept in good condition. Report any damage or potential hazards to maintenance personnel.
6. The weld heat selection switch, potentiometer or range selection devices must not be changed to a new position while a weld operation is in process.

12.0 BUYERS GUIDE

HOW TO ORDER PARTS:

You must provide
1. Machine Model

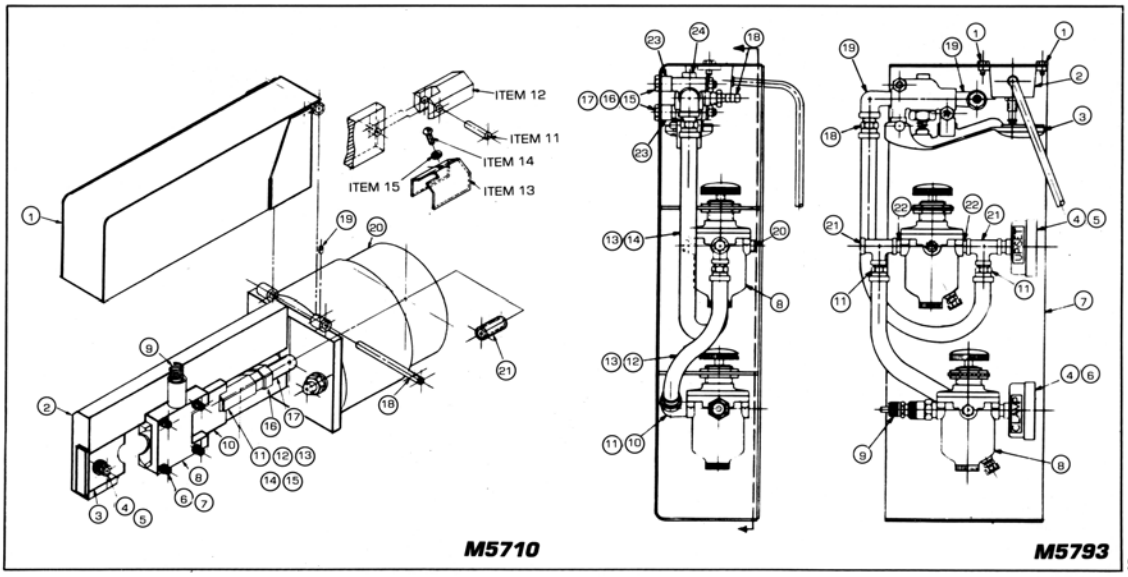
2. Machine Serial Number
3. Voltage

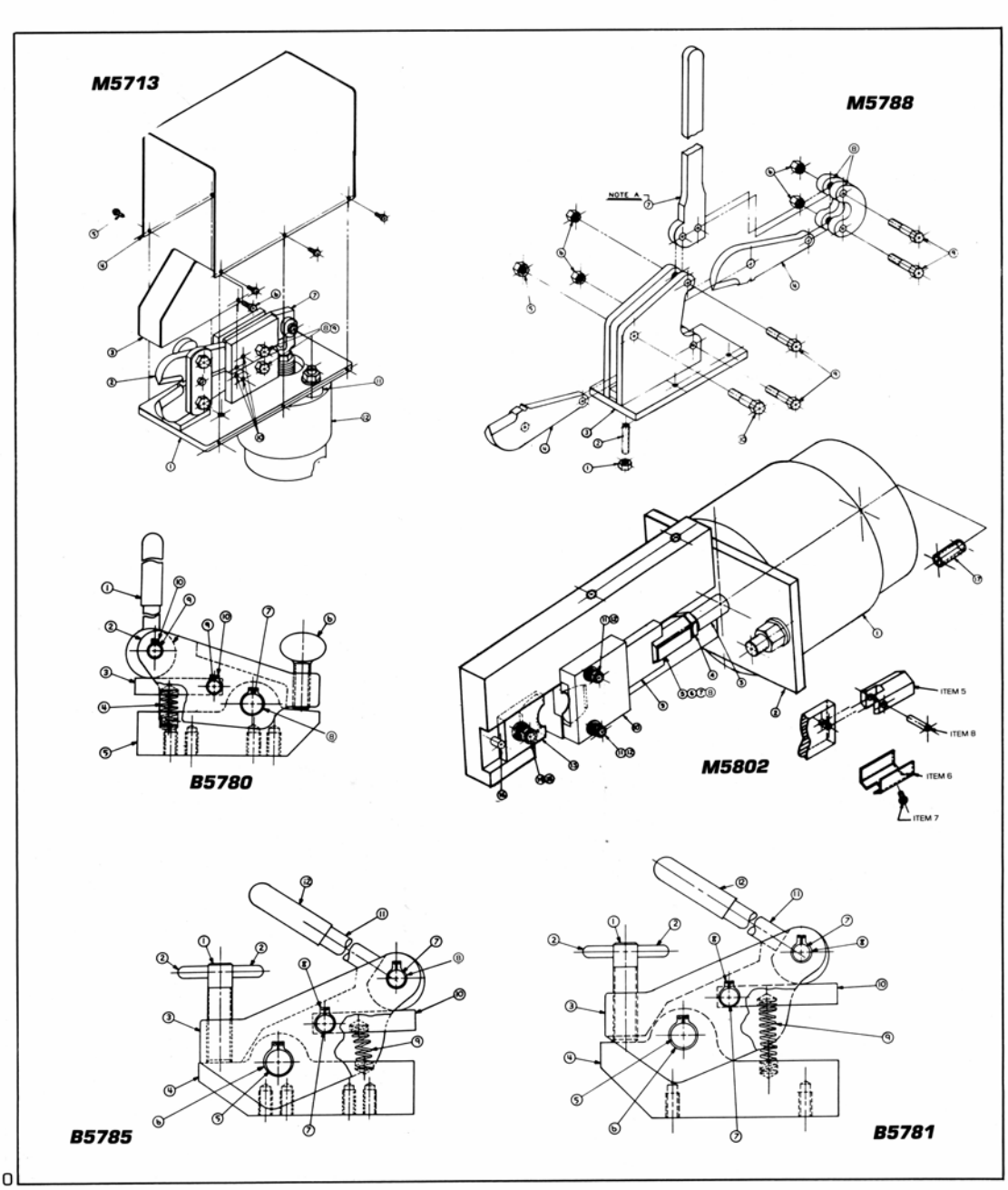
Then identify part(s) on part list (last page in book) and provide MICRO with the circled number.

CALL MICRO at 800-872-1068
OR FAX MICRO at 630-787-9360

Provide MICRO with your company name and purchase order number.

13.0 PARTS LIST


ITEM 12
ITEM 11
ITEM 14
ITEM 15
ITEM 13
M5710
M5793


M5713
M5788
NOTE A
B5780
M5802
ITEM 5
ITEM 8
ITEM 6
ITEM 7
B5785
B5781

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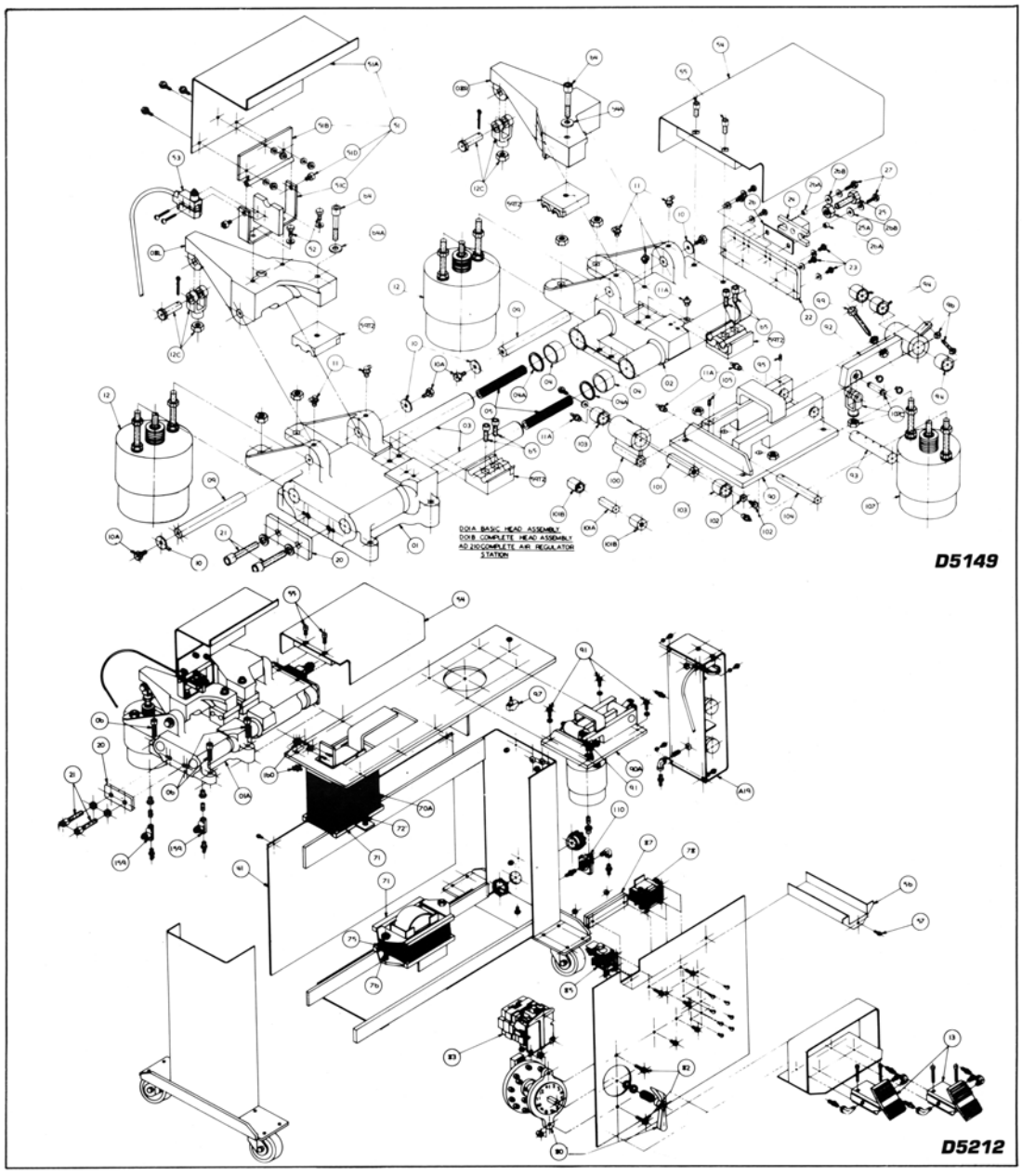

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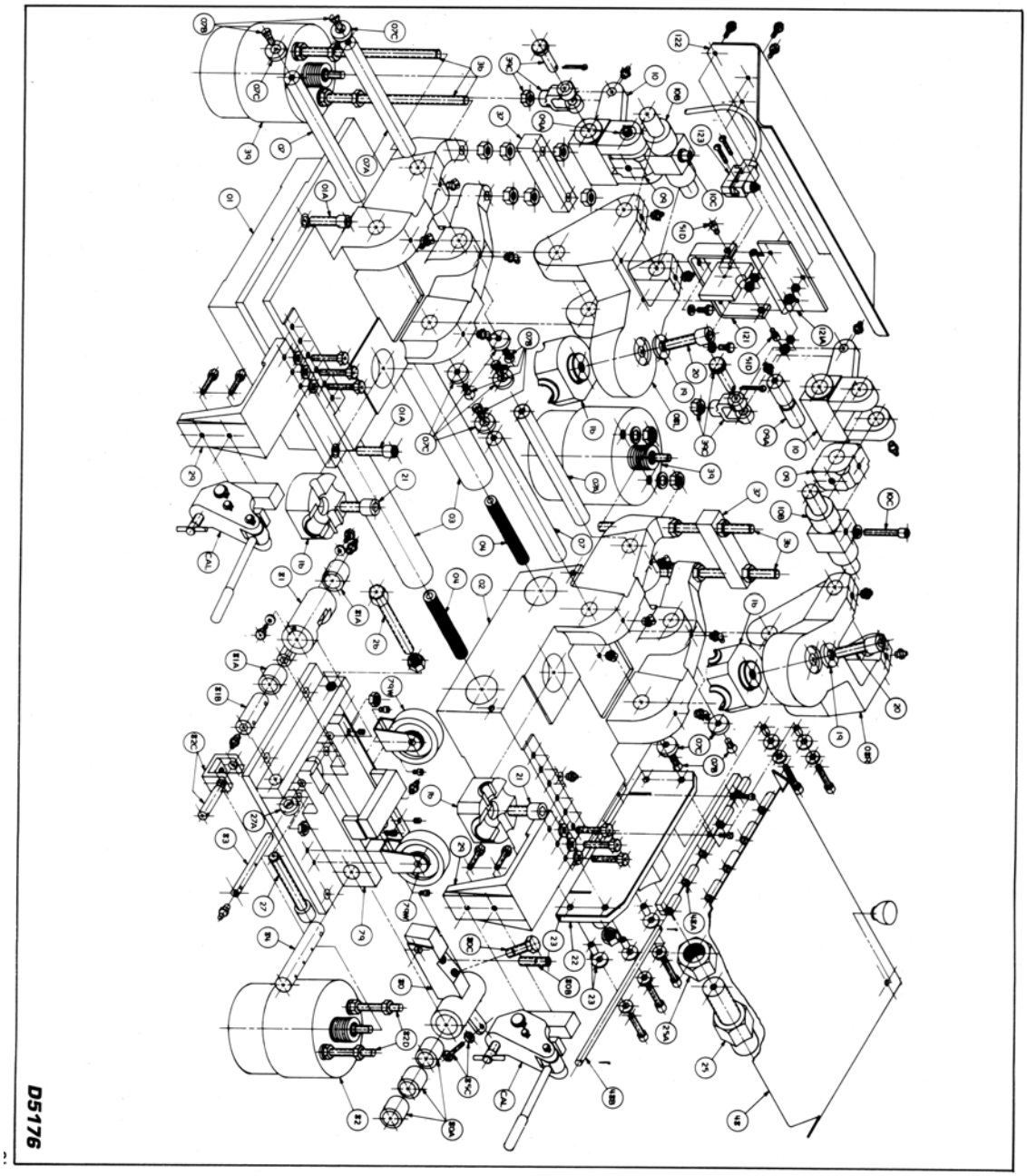
D5176

PARTS LIST AD3, AD4, AD5		
MODEL/ PART NO	**DESCRIPTION**	**ITEM #**
D-01A	Basic head assembly	30654
D-01B	Complete head assembly	30655
D-04	Shaft wipes	30640
D-04A	Shaft wipe retaining ring	48219
D-05	Head return spring	80059
D-08L	Clamp arm, left	30554
D-08R	Clamp arm, right	30614
D-09	Arm pivot pin bronze	30502
D-10	Arm pin washer	30517
D-10A	Arm pin bolt	90258
D-11	Grease zerk, 90 degrees	48422
D-12	Clamp cylinder #50	77706
D-12A	Cylinder replacement diaphragm #50	77713
D-12B	Cylinder shaft boot #50	77718
D-12C	Clamp cylinder clevis #50	77727
D-13	Foot pedal	77859
D-13A	Hand valve (special Suspended weld)	77864
D-14	Pedal mount screw	90611
D-20	End plate, stationary head (AD4, AD5)	30548
D-20	End plate, stationary head (AD3)	50502
D-21	End plate mount bolt, stationary head (AD3-AD5)	90664
D-21	End plate mount bolt, stationary head (AD4)	90687
D-22	End plate movable head	30518
D-23	End plate mount bolt, movable head	90203
D-24	Push up block	30503
D-25	Closed space bolt, adjustable	30506
D-25A	Closed space locknut	92107
D-26	Push up block insulating plate	30504
D-11A	Grease zerk, straight	48423
D-26A	Insulating tube	30638
D-26B	Insulating washer	92906
D-27	Push up block mount bolt	90260
D-30	Stationary anneal extension bar (AD3)	62078
D-30	Stationary anneal extension bar (AD4-AD5)	62079
D-31	Front anneal bar	62080
D-32	Anneal bar mount bolts	90260
D-33	Movable anneal extension bar	62081
D-34A	Anneal bar bracket (AD5)	62082
D-35	CA anneal, each (front)	62155
D-36	CAL anneal, pair	62020
D-37	Anneal clamp mount bolt	90260
D-40	Complete truck (AD3)	40599
D-40	Complete truck (AD4)	40592
D-40	Complete truck (AD5)	40600
D-41	Truck door	40540
D-43	Swivel caster	48108

PARTS LIST AD3, AD4, AD5		
MODEL/ PART NO	**DESCRIPTION**	**ITEM #**
D-44	Stationary caster (special order)	48117
D-45	#4 shear, long handle	64009
D-46	Shear mount bolt	90295
D-47	Standard vise	78112
D-47H	Heavy duty vise	78111
D-48	Standard vise bracket	60022
D-48H	Heavy duty vise bracket	60005
D-49	Vise bracket mount bolt	90295
D-50	Vise mount bolt	90262
D-51	Flashguard assembly less switch	30656
D-51A	Flash shield	30500
D-51B	Flash shield bracket assembly	30519
D-51C	Pivot plate assembly	30639
D-51D	Pivot screw	93078
D-52	Flashguard mount bolt	30672
D-53	Flashguard safety switch	57813
D-54	Upset cover	30516
D-55	Upset cover mount screw	90656
D-56	Flash tray (AD3)	40502
D-56	Flash tray (AD4)	40500
D-56	Flash tray (AD5)	40501
D-57	Flash tray mount bolt	90258
D-64A	Shoe attaching washer	92754
D-64	Shoe mount bolt	90677
D-65	Die mount bolt	90657
D-70A	Transformer, weld, state voltage & serial number(AD3)	50551
D-70B	Transformer, weld, state voltage & serial Number (AD4)	50546
D-70C	Transformer, weld, state voltage & serial Number (AD5)	50547
D-70AP	Primary coil, state voltage & serial number(AD3)	53049
D-70BP	Primary coil, state voltage & serial number(AD4)	50545
D-70CP	Primary coil, state voltage & serial number(AD5)	50541
D-70AS	Secondary (AD3)	50550
D-70BS	Secondary (AD4)	50512
D-70CS	Secondary (AD5)	50528
D-71	Transformer ring (AD3)	50504
D-71	Transformer ring (AD4)	50506
D-71	Transformer ring (AD5)	50505
D-71A	Lower transformer ring (AD4-AD5)	50536
D-72	Transformer studs ½" NC	50518
D-73	Transformer studs ¾"-NC	50521
D-75	Auto transformer (AD3-AD4)	50567
D-75C	Auto transformer ring (AD3-AD4)	42593
D-75P	Primary (AD3-AD4)	50568
D-78	Control circuit step-down transformer	57602

PARTS LIST AD3, AD4, AD5		
MODEL/ PART NO	**DESCRIPTION**	**ITEM #**
D-79	8pt heat switch (AD5)	56548
D-80	12 point heat switch (AD3)	56547
D-82	Heat switch mount bolt	90294
D-83A	Contactor	57611
D-83C	Contactor repair kit	Application
D-85	Pneumatic time delay switch	57661
D-87	Terminal block	53000
D-90	Upset frame	30515
D-91	Upset frame mount bolt	90294
D-92	Lever bar	30513
D-93	Lever bar pivot pin	30508
D-94	Pivot pin, bearing & upset pin	48403
D-95	Pivot pin retaining screw	90015
D-96	Limit switch adjust screw	53005
D-96A	Limit switch screw locknut	92056
D-97	Limit switch	59084
D-99	Open space adjust bolt	30510
D-100	Toggle link	40554
D-101	Upset pin	30511
D-101A	Reduced diameter upset pin	92557
D-101B	Reduced diameter pin end cap	30507
D-102	Upset pin retaining washer & bolt	30637
D-104	Toggle link pivot pin	30512
D-105	Toggle pivot pin retaining screw	90015
D-106	Upset cylinder #30 (AD3-AD4)	77704
D-106A	Replacement diaphragm #30 (AD3-AD4)	77711
D-106B	Cylinder shaft boot #30 (AD3-AD4)	77717
D-106C	Upset cylinder clevis #30 (AD3-AD4)	77727
D-107	Upset cylinder #36 (AD5)	77705
D-107A	Replacement diaphragm #36 (AD5)	77712
D-107B	Cylinder shaft boot #36 (AD5)	77717
D-107C	Upset cylinder clevis #36 (AD5)	77727
D-159	Clamp cylinder flow control valve	77862
D-210	Air regulator station complete (see separate part list)	59511
D-211	Muffler	77892
	Dies	
AD-59T2	Standard radius groove dies, stellite inserts, conical tips, state size (0 - .500)	30595
AD-59T2	Standard radius groove dies, stellite inserts, conical tips, state size (.500 - .750)	30596
AD-59T2C	Standard radius groove dies, stellite inserts, custom tips, state sizes	30597
AD-59T3	Standard radius groove dies, stellite inserts 3 grooves, state sizes	30598
AD-59T1	Broach radius groove dies, stellite inserts, state size	30624